

Decision

Offshore Transmission: Cost Assessment for the Hornsea Project One Transmission Assets

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This document sets out the cost assessment for the Hornsea Project One offshore transmission assets. This assessment of costs will be used by the Gas and Electricity Markets Authority (the **Authority**) to determine the value of the Hornsea Project One transmission assets to be transferred to the successful bidder.

The Final Transfer Value of the Hornsea Project One offshore transmission assets is established as £1,175m. This value is published in the section 8A licence consultation, and we do not expect any further changes to the Assessed Costs. However, we do not intend to finalise the Final Transfer Value until the Authority has determined to grant an offshore transmission licence to the successful bidder.

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Executive summary

This report sets out the cost assessment work that Ofgem has undertaken from the Invitation to Tender (**ITT**) stage of the Tender Process in relation to the Hornsea Project One Offshore Wind Farm transmission assets (the **Transmission Assets**). This work has been used by the Authority to derive the Assessed Costs and will be used to set the Final Transfer Value (**FTV**) for these assets.

The cost assessment process involves the three key stages indicated below:

- The Initial Transfer Value (**InTV**) for the Transmission Assets was published in the preliminary information memorandum in November 2018 and was set at £1,396.0m based on information provided to Ofgem by the developer, Ørsted A/S and Global Infrastructure Partners (the **Developer**);
- The Developer submitted a revised cost assessment template (**CAT**) dated 31 January 2019 and a second version dated 1 March 2019 (the **March CAT**). Ofgem reviewed and analysed the cost information and calculated the Indicative Transfer Value (**ITV**) as £1,216.9m. This updated calculation was communicated to the Developer in June 2019 and the formal ITV letter issued in November 2019; and
- The Developer submitted a further CAT dated 31 January 2020 and an updated CAT dated 28 February 2020 of £1,230.4m (the **February CAT**). Ofgem reviewed this further cost information to calculate the final assessment of costs as £1,174.9m (the **Assessed Costs**). This is a reduction of £55.5m from the February CAT. The Developer has confirmed that the incoming Offshore Transmission Owner (**OFTO**) will be able to obtain the full benefit of all available capital allowances. Therefore, the final Assessed Costs of £1,174.9m is the amount that will be used to set the Final Transfer Value (**FTV**) at licence grant.

The key components of the InTV, the ITV and the FTV, together with the Developer's submission (February CAT) are set out in Table 1 below.

Table 1: Summary of costs components*

Category	InTV	ITV	Developer submitted cost for FTV review (February CAT)	FTV
	Nov 18 (£m)	Nov19 (£m)	Feb20 (£m)	Sep20 (£m)
Capex	1122.7	1014.0	1031.0	997.3
Development**	93.3	80.5	60.8	59.7
Contingency	50.6	16.2	0.0	0.0
IDC	161.1	102.6	134.5	114.1
Transaction	3.5	3.6	4.1	3.8
Total	1396.0	1216.9	1230.4	1174.9

**these figures may not add to totals due to rounding*

***Development represents all costs within the cost category 'Other' (CR8) in the Cost Assessment Template. This includes development costs, as well as other common costs.*

Sections 3.32 – 3.88 set out details of the Assessed Costs and any reductions made to the values submitted in the February CAT and against the ITV. The main increases/decreases, against the ITV figures, were as follows:

- a) The Capital expenditure (**Capex**) component of the FTV has decreased by £16.7m;
- b) The development costs have decreased by £20.8m;
- c) The ITV contingency amount of £16.2m was not included by the Developer in the February CAT;
- d) The Interest During Construction (**IDC**) increased by £11.5m; and
- e) The transaction costs have increased by £0.2m.

Below we summarise the main increases and decreases to each cost category as shown in Table 1 and detailed in sections 3.32 – 3.88. Please note that the figures set out in this section have been rounded.

Capital expenditure (Capex)

The Capex of the FTV has decreased by £16.7m since ITV. The main changes are:

Increases of £16.6m for:

- a) cost updates to Supply and Installation
- b) costs re-allocated from the category 'Other'

Decreases for:

- a) costs disallowed at ITV and re-submitted in the February CAT
- b) paint repairs to the Offshore Substation Platform (**OSP**)
- c) generation-related costs
- d) fibre optic cables for generation use
- e) costs removed by the Developer
- f) additional vessel related costs
- g) inefficient boulder clearance
- h) waiting time and acceleration payments
- i) other minor adjustments.

Development costs

The development costs at FTV have decreased by £20.8m since ITV. The main decreases are for:

- a) general cost updates
- b) adjustments to land costs related to ancillary costs for Hornsea Project Two and costs incurred during the operational period
- c) reallocation of costs to Capex.

Contingency

We allowed £16.2m of contingency in the ITV. This was not included by the Developer in the February CAT submission.

Interest during construction

The Interest During Construction (**IDC**) amount has increased by £11.5m since the ITV. This increase is the result of balancing positive adjustments (for longer time allowed for the development phase in line with other projects) and negative adjustments (for disallowed costs and timing of assets considered available for use) to the calculated IDC.

Transaction costs

Transaction costs have been assessed at £3.8m. The transaction costs are composed of both internal and external resource costs arising from the Developer's participation in the tender process. These have increased since the ITV, due to transaction budget being revised and costs firmed up at FTV.

Assessed Costs and FTV for the Transmission Assets

In accordance with Regulation 4(2)(b) of the Tender Regulations, the Assessed Costs of the Transmission Assets are £1,174,931,778. The Assessed Costs will be used as the FTV in accordance with Regulation 4(8) of the Tender Regulations.

1. Introduction

Context and related publications

1.1. In 2009, the Government introduced the regulatory regime for offshore electricity transmission to connect significant amounts of renewable offshore generation to the onshore electricity network (the **OFTO regime**).

1.2. Offshore Transmission Owners (**OFTOs**) are appointed through a competitive tender process (the **Tender Process**). OFTOs are granted an offshore transmission licence (**OFTO Licence**) with a fixed revenue stream for a specified time.

1.3. From the outset, the OFTO regime has encouraged innovation and attracted new sources of technical expertise and finance, whilst ensuring that grid connections are delivered efficiently and effectively.

1.4. The Electricity (Competitive Tenders for Offshore Transmission Licences) Regulations 2015 (the **Tender Regulations**) provide the legal framework for the Tender Process. The Tender Regulations require the Authority¹ to calculate, based on all relevant information available to it, the economic and efficient costs which ought to be, or ought to have been, incurred in connection with developing and constructing the offshore transmission assets in respect of a qualifying project.

1.5. Where the Authority has determined to grant an OFTO Licence for a particular project, the assessment of costs must be used by the Authority to determine the value of the transmission assets to be transferred to the successful bidder. This value will be reflected in the revenue stream in the offshore electricity transmission licence granted to the OFTO.

1.6. This report should be read in conjunction with the "Offshore Transmission: Guidance for Cost Assessment" (the **Cost Assessment Guidance**).

¹ The Gas and Electricity Markets Authority (**GEMA**) is the regulator of gas and electricity markets in Great Britain. Ofgem is the Office of Gas and Electricity Markets, which supports the Authority in performing its statutory duties and functions. In this document the terms, 'Authority', 'Ofgem', 'we' and 'us' are used interchangeably.

Associated publications

- The Electricity (Competitive Tenders for Offshore Transmission Licences) Regulations 2015 [Link](#)
- Tender Process Guidance Document TR6 [Link](#)
- Offshore Transmission: Guidance for Cost Assessment [Link](#)

2. The cost assessment process

Section summary

The Tender Regulations require the Authority to calculate, based on all relevant information available to it, the economic and efficient costs which ought to be, or ought to have been, incurred in connection with developing and constructing the offshore transmission assets in respect of a project. This section sets out the process that Ofgem followed in carrying out the cost assessment for the Hornsea Project One offshore transmission project (the **Project**).

Overview of the cost assessment process

2.1. The Tender Regulations provide the legal framework for the process we follow for granting offshore electricity transmission licences. This process includes calculating the economic and efficient costs of developing and constructing the offshore transmission assets to be transferred to the new OFTO.

2.2. The calculation of those shall be:

- a) Where the construction of the transmission assets has not reached the stage when those transmission assets are available for use for the transmission of electricity, an estimate of the costs which ought to be incurred in connection with the development and construction of those transmission assets; and
- b) Where the construction of the transmission assets has reached the stage when those transmission assets are available for use for the transmission of electricity, an assessment of the costs which ought to have been incurred in connection with the development and construction of those transmission assets.

Cost assessment principles

2.3. The cost assessment principles, the reasoning for such principles and overall process we have adopted can be found in the Cost Assessment Guidance.

2.4. We have applied these principles in our cost assessment process for the Project and, where appropriate, we have taken into account project-specific circumstances.

2.5. The remainder of this section describes some of the key elements of the cost assessment process. Section 3 provides the detail as to how these have been applied to the specifics of the Project.

Data collection

2.6. To undertake cost assessments we gather and review a range of information and supporting evidence. These relate to the forecast and actual costs of developing and constructing the transmission assets that will transfer to the OFTO. Detailed cost information is provided by the relevant Developer in the form of cost assessment templates (**CATs**), contract values, asset cost schedules and cashflows. The Developer also provides supporting evidence to substantiate its cost submissions including, amongst other things, contract documentation, supplier payment lists and invoices and receipts.

2.7. We work closely with the Developer to gather information relating to the following cost categories in the development and construction of the relevant transmission assets:

- a) Capital expenditures;
- b) Development costs;
- c) Contingency provisions;
- d) Interest during construction; and
- e) Transaction costs.

Process stages for cost assessment

2.8. The cost assessment process involves the key stages described below.

Initial Transfer Value

2.9. The InTV value is based on cost submissions by the developer for the relevant project. This value is made available to bidders at the Pre-Qualification or the Enhanced pre-qualification (**EPQ**) stage of the tender process. The letter we send to the developer at this time indicates that the calculation might be updated as a result of any further information provided by the developer and our continuing analysis.

Indicative Transfer Value

2.10. We provide the estimate of costs for the transmission assets (the **ITV**) for the commencement of the Invitation to Tender (**ITT**) stage of the tender process. This value is used as an assumption underlying the tender revenue stream (**TRS**) bids submitted by bidders at the ITT stage. The ITV letter we send to the developer at this stage confirming the ITV indicates that the calculation might be updated as a result of any further information provided by the developer and our continuing analysis.

Assessed Costs

2.11. As soon as reasonably practicable after the ITV has been completed, we are satisfied that the assets are available for use and we have obtained any further information that we require, we commence the exercise to determine the Assessed Costs.

2.12. Following this assessment exercise, Ofgem sends the developer a draft cost assessment report (in the form of this Report) setting out the amount of the Assessed Costs. This gives the developer the opportunity to correct factual errors and propose the redaction of commercially sensitive information.

2.13. The draft cost assessment report is also sent to the preferred bidder, to allow it to incorporate the Assessed Costs into its estimate of the TRS payable to the OFTO. This TRS amount, incorporating the Assessed Costs, is published in a consultation pursuant to section 8A of the Electricity Act 1989, by which the Authority proposes modifications to the standard conditions of the OFTO Licence on a project specific basis (the **Section 8A Consultation**).

2.14. The **draft** cost assessment report is published alongside the Section 8A Consultation. The report remains in draft form until the conclusion of the Section 8A Consultation and the Authority has determined to grant the OFTO Licence to the successful bidder.

Final Transfer Value

2.15. If a developer retains some of the benefit of the available capital allowances, we reduce the relevant amount from the Assessed Costs before we derive the FTV. The FTV is confirmed once the Authority has determined to grant an OFTO Licence to the successful bidder. After licence grant, the final cost assessment report and supporting appendices are published on the Ofgem website.

2.16. Ofgem normally finalises the assessment of costs prior to commencement of the Section 8A Consultation. The FTV is taken into account when the section 8A TRS for the full licence period is published.

Cost assessment analysis

2.17. Throughout the cost assessment process, Ofgem applies two key tests to the cost information submitted by the developer. These are:

Test 1 - Assessing if a developer's cost submissions are accurate and allocated appropriately

2.18. As a first test, we check the accuracy of the data provided by the developer and the appropriateness of cost allocations, in particular, between the offshore generation and transmission assets. Throughout the cost assessment process, the developer provides cost information to us on an ongoing basis. Where we identify discrepancies in how the developer has allocated these costs, we check with the developer to assess if they have been allocated to the correct asset category and make adjustments accordingly.

2.19. To support the cost assessment process, we undertake a forensic accounting investigation. The scope of this investigation is shared with the developer in advance. This investigation is based on the final costs that the developer provides to us, and applies to a sample of contract costs. The actual sample for each project varies due to the different contracting strategies adopted by the developer and the specific needs of the project, but generally focuses on the most expensive contracts and/or contracts that materially increase in cost.

2.20. The forensic accounting investigation scrutinises the cost allocations provided by the developer. This may indicate the need for amendments to the developer's submissions to reflect, for example:

- a) The actual costs incurred (e.g. in respect of exchange rates on foreign currency payments); and/or
- b) More relevant metrics for the allocation of shared service costs.

2.21. Where amendments, in our opinion, are required and, in the absence of further evidence from the developer to substantiate the original allocation, we incorporate the recommended changes from the forensic accounting investigation.

Test 2 - Assessing if a developer's cost are economic and efficient

2.22. Under test two we assess whether the costs reported to date by the relevant developer have been economic and efficient.

2.23. We undertake benchmarking analysis using cost reporting data from other projects. This is used to identify cost outliers reported by offshore developers. Where cost outliers are identified on a project, these are further reviewed and Ofgem may use external consultants to investigate the reasons for this and evaluate whether the costs are economic and efficient.

2.24. We also consider the procurement processes adopted by the developer to obtain economic and efficient transmission asset costs.

2.25. When undertaking the assessment of costs to derive the FTV, we review updated information provided by the developer, as well as any cost areas flagged for further investigation at the ITV stage. Where costs have increased since the ITV, we ask the developer to provide supporting documentation to justify these increases. We may undertake a technical investigation that focuses on, for example, a particular cost component, such as an increase of costs in a contract or multiple increases across several contracts.

3. Hornsea Project One cost assessment

Section summary

This section sets out a short description of the wind farm and the transmission assets, based on information provided by the Developer. It then summarises how we have undertaken our cost assessment for the Transmission Assets, from the InTV to the FTV and provides a breakdown of the key cost categories that we have considered and highlights the decisions that we have made.

Transmission Assets²

3.1. The Hornsea Project One Wind Farm is situated in the Hornsea zone, approximately 120km east of the Humber Estuary in East Yorkshire. The offshore site includes three offshore substations for three wind farm parks; West (Z11), Central (Z12) and East (Z13), and a single reactive compensation station (RCS) (Z01) in the export cable routes at approximately kilometre point (KP) 66.

3.2. The project consists of three offshore export cable circuits: East, Central and West, and two interlink cables, interlink 1 – West and interlink 2 – East, connecting the offshore substations. The cable circuits are divided into two main sections: main lay area (between the offshore platforms and RCS) and shore area (between RCS and the landfall area). The average route length from the offshore platforms to the onshore Transition Joint Bay (TJB) of the three offshore export cable circuits is approximately 145km.

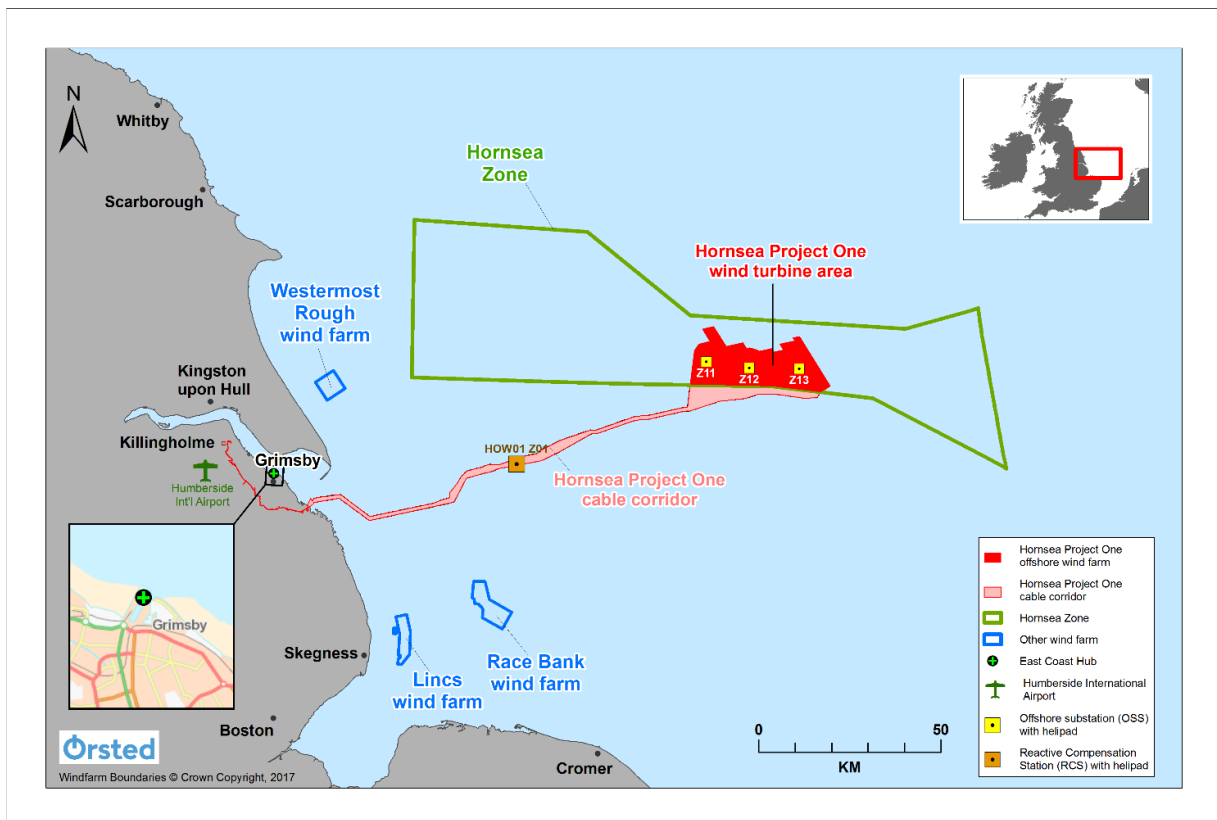
3.3. The offshore export cables are pulled through three Horizontal Directional Drill (HDD) cable ducting systems that are installed at the offshore exit point/onshore entry point close to the Transition Joint Bay (TJB), behind the sea defence. The three onshore export cable circuits, along with three external fibre optic cables have been installed between the TJB and the new substation in North Killingholme, North Lincolnshire. The

² The technical information contained in this section of the Report is based on information provided by the Developer and has not been independently verified by Ofgem.

onshore cable route length is approximately 38km. Two 400kV cables connect the new HOW01 substation and the adjacent NGET Substation Killingholme.

3.4. The onshore substation is located at approximately 40km from the landfall point at Horseshoe Point, in North Lincolnshire adjacent to Killingholme Power Station. The onshore substation site is accessed via the power station access road owned by CGEN Killingholme. Figure 1 provides an overview of the geographical location of the project.

Figure 1: Location of the Hornsea Project One Offshore Wind Farm and Transmission Assets



3.5. The Hornsea Project One Offshore Wind Farm is owned by Hornsea One Limited, which is jointly owned by Ørsted (50%) and Global Infrastructure Partners (GIP) (50%) (collectively, the **Developer**).

3.6. The Transmission Assets connect to the Hornsea Project One Offshore Wind Farm at the three offshore platforms. The Transmission Assets that are transferring to the OFTO comprise:

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- a) Three offshore substations;
 - b) An offshore reactive compensation station
 - c) Three buried offshore export cable circuits with an average route length of approximately 145km;
 - d) Three onshore transition joints and three onshore export cable circuits with a route length of approximately 38km; and
 - e) an onshore substation where the onshore cables connect via two 400kV cables to two double bus bar 400kV GIS bays within the existing NGET Killingholme substation.

The helideck and the helicopter refuelling system and monitoring on the RCS will be transferred to the OFTO.

3.7. The onshore and offshore boundary points proposed by the Developer are as follows:

- a) "Offshore Boundary Point" means the offshore boundary point located at the 34kV cables terminating at the 34kV medium voltage switchgear connecting from the grid transformers on the Offshore Substations; and
- b) "Onshore Boundary Point" means the onshore boundary point located at the gas zone on the busbar side of the busbar disconnectors of the Hornsea 1 project's gas insulated switchgear bays called Hornsea 1 and Hornsea 2 contained within the existing NGET Killingholme 400kV substation.

3.8. The spares included in the Transmission Assets that are transferring to the OFTO are:

- a) All onshore and offshore cable spares will be transferred to the OFTO.
- b) Various joints (transition, straight and cable repair joints);
- c) Cable terminations; and
- d) Other miscellaneous spares.

Overview of cost assessment process for Hornsea Project One

3.9. We received the first cost information from the Developer in August 2018. Since then we have worked with the Developer and our advisers to reach an assessment of the costs which ought to have been incurred in connection with the development and construction of the Transmission Assets. We set out below an outline of the steps taken, and to be taken, in the cost assessment process for the Project.

- a) **November 2018:** InTV (£1,396.0m) published.
- b) **January 2019:** Developer submitted the ITV CAT (the **January 2019 CAT**)
- c) **March 2019:** Developer provided revised CAT (the **March CAT**).
- d) **June 2019:** ITV figure (£1216.7m) determined and communicated to Developer.
- e) **November 2019:** formal ITV letter issued.
- f) **July – November 2019:** ITT process (bidding and evaluation).
- g) **February 2020:** Developer submitted a revised CAT updated to the 30th January 2020 (the **January CAT**).
- h) **March 2020:** Developer submitted a revised CAT with re-allocations of costs to specific categories from the 'other' category, updated to the 28th February 2020 (the **February CAT**)
- i) **March 2020 - Jun 2020:** forensic accounting and FTV investigation undertaken.
- j) **March-Sep 2020:** final cost reporting updates and final supporting information received from the Developer.
- k) **November 2020:** this draft cost assessment report released to the Developer for comment and the Preferred Bidder for information.
- l) **January 2021:** draft cost assessment report published alongside the Section 8A Consultation.
- m) **March 2021:** The Authority to determine the FTV when granting the licence to the successful bidder. The final cost assessment report will be published after licence grant.

Summary of the InTV and ITV determination

3.10. The InTV of £1,396.0m was published in November 2018. This value was based on information received from the Developer at an early stage in the construction and development of the Project. This value was included in the EPQ document and Preliminary Information Memorandum (**PIM**) for the commencement of the EPQ stage of the Project.

3.11. The ITV of £1,216.9m was established in June 2019, with the formal ITV letter issued to the Developer in November 2019. Our estimate was supported by our forensic accounting advisors, Grant Thornton (**GT**), our internal analysis and the supporting information provided by the Developer.

3.12. We conducted an in-depth cost analysis at ITV, however some costs could not be fully investigated and were highlighted as needing further attention at the FTV stage. These included a review of boulder clearance costs, investigation into claims related to the supply and installation of the subsea cable, “remaining” and unsubstantiated costs, variation costs around OSP design, calculation of the allocation percentage between generation/transmission assets and dates for ceasing IDC.

3.13. Below are the main points arising from our review, the forensic review and a description of the adjustments applied at ITV. Full details are set out in the ITV letter issued by Ofgem on 21 November 2019 (the **ITV Letter**).

Ofgem review – Crosscutting issues

3.14. In conducting the ITV cost review, Ofgem highlighted some crosscutting issues, i.e. issues that apply across more than one cost category, in addition to specific cost category adjustments. These are all described below.

3.15. We analysed resources costs and made reductions across all categories relating to the transfer pricing mark-up applied to all Developer resourcing costs not incurred in Danish Krone. At ITV we stated that resources costs would be reviewed at FTV.

Ofgem review – Individual cost categories

3.16. We undertook a detailed review of each cost category. Below we summarise the adjustments made to each category. Full details of the ITV review are in the ITV Letter.

Offshore Substation Platforms (OSPs)

3.17. We reviewed at ITV the costs for the design, supply, installation, commissioning and project management of the three OSPs and reduced this category by £27.6m overall. This adjustment was made up of the following reductions for:

- a) generation-related costs;
- b) various disallowed contractors' claims related to changes to design and for buoyancy tanks removal;
- c) delays in other areas of the project
- d) reductions applied by **GT** due to the disparity between the total amount of the variation orders for the main installation contract shown on the system and the amount shown in the March CAT; and
- e) transfer pricing mark-up, as highlighted above.

Submarine cable supply and installation

3.18. We reduced the costs submitted for the design, fabrication, installation and project management of the submarine cables by £9.7m. This adjustment included reductions for:

- a) helicopter transportation costs not incurred;
- b) changes in the submarine cable joint design. The Developer provided further justification for these costs, which we have reviewed at the FTV assessment;
- c) the Project's spare submarine cables where we allowed a portion of the spares (18.9 km);
- d) a reimbursement due to aborted joining works; and
- e) transfer pricing mark-up, as highlighted above.

Onshore cables

3.19. We reduced the costs submitted for the design, fabrication, installation and project management of the onshore cables by £5.6m. This adjustment included reductions for:

- a) inefficient procurement of gabion bags and acceleration works to meet generation driven targets;
- b) additional Horizontal Directional Drilling (HDD) and construction of a landfall bridge, as we did not receive clarification on these issues in time for our ITV assessment. We have reviewed this information at FTV;

-
- c) A reduction for damages caused by the contractor;
 - d) A series of reductions related to bad weather; and
 - e) transfer pricing mark-up, as indicated in the cross-cutting issues.

Onshore Substation

3.20. We reduced the costs submitted for the design, fabrication, installation and project management of the onshore cables by £1.3m. This adjustment included reductions for:

- a) transfer pricing mark-up, as indicated in the cross-cutting issues; and
- b) A reduction for the incorrect specification of materials attributable to interface issues.

Reactive Compensation Substation (RCS)

3.21. The Developer submitted costs for the design, supply, installation, commissioning and project management of the RCS and we reduced costs by £42.6m. This adjustment was made up of the following reductions for:

- a) design changes, which we attributed as the contractors' responsibility. The Developer submitted further evidence, which we have reviewed at FTV, see section 3.75-3.77;
- b) late handover of the Dynamic Reactive Compensation (DRC) building. These costs relate to the onshore substation and have been re-allocated there at FTV;
- c) costs arising as a result of inefficiencies or delays;
- d) costs regarding the original contract and amendments related to the RCS platform;
- e) two reductions associated with the helideck on the RCS, as we do not consider the helideck a necessary asset for the OFTO;
- f) reductions identified by **GT** during their ex-ante review; and
- g) transfer pricing mark-up, as highlighted in the cross-cutting issues.

Other Costs

3.22. We reviewed the costs submitted in the "Other" category and adjusted costs for resources (see cross-cutting issues). We also highlighted certain costs to be reallocated to other costs categories. The Developer agreed to do this for the FTV submission.

Transaction costs

3.23. We applied the adjustment related to resources, in relation to the cross-cutting issues. No other reductions were made, as these costs are estimates at the ITV stage.

Interest During Construction (IDC)

3.24. We reduced IDC by £47.7m, based on:

- a) correction of the applicable IDC rate;
- b) adjustment related to the duration of the development phase of the Project;
- c) adjustment related to the timing of capex eligibility for IDC, where the availability of the assets for transmission of power to the onshore network was based on the energisation dates; and
- d) re-calculation of IDC following other cost adjustments made as part of the ITV process.

Forensic Review

3.25. When establishing the ITV, we took into account the results of the forensic investigation conducted by our independent consultant **GT**. They recommended a number of adjustments due to updated cost estimates. The net result of this review was a decrease of £6.5m to the January CAT. We incorporated part of this adjustment in the ITV. The full ITV adjustment was then reviewed as part of the ex-post investigation and remaining adjustments still applicable have been incorporated at FTV.

Process for determining the Assessed Costs

Accuracy and Allocation

3.26. The Project was constructed using a multi-contracting strategy. An ex-post forensic accounting investigation was undertaken by **GT** to ensure that the costs reported to us by the Developer were accurate, in that they represented the actual costs incurred by the Developer during the development and construction of the Project.

3.27. This investigation considered the following main contracts in respect of the Transmission Assets:

- a) ABB and NKT for the supply of subsea cables (Supply 1);
- b) NKT for the supply of subsea cables (Supply 2); Due to the magnitude of the Project a dual-supplier strategy was considered necessary, in order to be certain of the availability of the length of offshore export cable for the Project;
- c) Tideway for the offshore export cable installation;
- d) Bladt for the fabrication of offshore substations topsides;
- e) a sample of the Developer's internal personnel costs, selected at random.

3.28. In addition, due to the size and value of the Project, and to ensure we would scrutinise enough contracts, we instructed **GT** to verify the amounts paid by the Project to a further three suppliers (Siemens, J Murphy & Sons and Balfour Beatty) through supplier confirmation emails.

Efficiency

3.29. After costs had been appropriately identified and allocated, we performed an assessment of whether these costs were economic and efficient, which involved an internal benchmarking review as well as a wider review of costs incurred in each cost category.

Summary of Assessment

3.30. Nearing completion of the Transmission Assets' construction, the Developer submitted in the January CAT, costs amounting to a value of £1,233.6m. Following our initial review, we advised the Developer to re-allocate certain costs from the "Other" category to specific categories in the CAT. This was to allow a consistent allocation of those costs that could be attributable directly to one or more cost categories, in line with the approach followed for other projects. In addition, we highlighted some costs that were disallowed at ITV and had been re-submitted at FTV.

3.31. The Developer reviewed the January CAT and re-submitted an updated version (the **February CAT**), showing total costs of £1,230.4m. Table 2 below provides a breakdown of the cost categories for the Project at each stage and the changes between the ITV and the FTV stages, and sections 3.32 – 3.88 set out the issues considered as part of the FTV stage.

Table 2: Summary of cost categories*

Category	InTV Nov18 (£m)	ITV Nov19 (£m)	FTV Sep20 (£m)	FTV - ITV	Reasons for change between ITV and FTV
Capex	1122.7	1014.0	997.3	-16.7	<p><u>Increases for:</u> updates to Supply and Installation. costs re-allocated from the category 'Other'</p> <p><u>Decreases for:</u> costs disallowed at ITV and re-submitted paint repairs generation-related costs (SCADA, metering, housing equipment) fibre optic cables for generation use costs removed by the Developer additional vessels related costs (cable load-out, additional trials, barge for cable transport) inefficient boulder clearance waiting time and acceleration works other minor adjustments (O&M contracts, damage by contractor, repeated work/design)</p>
Development**	93.3	80.5	59.7	-20.8	<p><u>Decreases for:</u> general cost updates reallocation of costs to Capex adjustments to land costs</p>
Contingency	50.6	16.2	0.0	-16.2	<p><u>Decreases of:</u> £16.2m due to contingency being released</p>
IDC	161.1	102.6	114.1	11.5	<p><u>Increases for:</u> adjustment to IDC by the Developer for asset availability</p> <p><u>Decreases for:</u> adjustments related to wet storage adjustments related to dates indicating asset availability for use reductions proportional to disallowances</p>
Transaction	3.5	3.6	3.8	0.2	<p><u>Increases for:</u> resource</p> <p><u>Decreases for:</u> operational costs adjustments to transaction costs</p>
Total	1396.0	1216.9	1174.9	-42.0	

**these figures may not add to totals due to rounding.*

***Development represents all costs within the cost category 'Other' (CR8) in the Cost Assessment Template. This includes development costs, as well as other common costs.*

Capital expenditure

3.32. The Capex element of the Assessed Costs is £997.3m. Overall, the Capex has decreased by £16.7m from the ITV to the FTV stage. This decrease is the overall result of a series of cost increases and decreases, as set out in more detail in Table 2 above.

Accuracy and allocation of Capex costs

3.33. For the majority of Capex costs incurred on the Project, it was clear whether they should be allocated to the Transmission or the Generation Assets in their entirety. For costs shared between Generation Assets and Transmission Assets, the Developer allocated a proportion of costs to the Transmission Assets using the capex ratio between generation and transmission assets.

3.34. Following our recommendations at ITV (see section 3.22) we checked that costs were allocated to the correct asset category, between Hornsea Project One Offshore Wind Farm generation assets (the **Generation Assets**) and the Transmission Assets. We recommended to re-allocate costs accordingly for £14.2m from the category 'Other' to the categories 'Submarine Cables' and 'Onshore Cables' as appropriate.

3.35. We examined the split of SCADA costs between Generation and Transmission Assets of the Project and found that the split was not reflective of the correct cost allocation. The Developer used expert judgement and previous projects examples to define the split, where SCADA costs were allocated 50/50 generation/transmission. We reviewed these costs with the Developer and only those costs related to the Transmission Assets were allowed in the FTV. The final split resulted in a cost reduction and a correction of the costs allocated to transmission (47%).

3.36. We also reviewed how costs were split throughout the cost categories and observed that it was apportioned equally (50/50) between the onshore and offshore cost categories. We asked the Developer to reconsider the split initially submitted so that costs reflect the amount of equipment/data attributable to each cost category.

3.37. We have accepted splitting SCADA costs equally between onshore and offshore substations in previous projects which included only one onshore and one offshore substation. This project is of much bigger proportions with four offshore platforms (three OSPs and one RCS), therefore we consider that the costs should be split amongst all cost categories that include SCADA components proportionally. The Developer provided a new

cost allocation between the onshore substation, the OSPs, the RCS and the connection cost categories, which we considered more appropriate and applied this cost split at FTV.

Efficiency of Capex costs

3.38. Most of the cost categories showed a decrease, with the exception of connection costs, which had an increase. The overall decrease is the result of cost updates from the Developer (see sections 3.52 - 3.53) and adjustments applied following our cost review, which are detailed below.

3.39. The Developer has provided additional information to support the costs submitted at the FTV stage, our analysis of these is set out below.

Crosscutting issues

3.40. Some costs were disallowed from the FTV based on a common rationale. We have indicated below the adjustments that we applied across different cost categories using the same principles.

Cost Disallowed at ITV

3.41. The February CAT included some costs that were disallowed as part of the ITV process. We continued the discussion of these costs with the Developer during the cost assessment and confirmed the position taken at ITV for the costs described below.

- a) costs for array J-tubes on the offshore substations; these costs were re-submitted by the Developer as the J-Tubes are OFTO assets (being welded onto the jackets) consistent with previous projects. We have confirmed that array J-tubes are now considered Generation Assets as they are associated with array cables and the Developer accepted to reclassify the assets to reflect Ofgem's position;
- b) various contractors' claims related to mistakes, design errors and acceleration works;
- c) costs for opening an additional installation window;
- d) costs associated with additional temporary generators used for accelerating works and allowing two jointing teams to operate simultaneously for cable jointing onshore;
- e) costs related to topsoil spraying;

-
- f) costs for the late installation of the Dynamic Reactive Compensation plant due to delays;
 - g) costs in relation to a pro-rata adjustment for the storage of the Project's spare submarine cables.

Ofgem's view

3.42. We discussed with the Developer the reasons as to why these costs were re-submitted and sought further evidence around their relevance. After investigating each of these additional costs and continuing the discussion with the Developer about the root cause, we confirmed our position at ITV and therefore we excluded them (£9.4m) from the FTV.

Paint repairs

3.43. The Developer's submission included costs for OSPs paint repairs and related scaffolding. The Developer explained that during OSP installation, damage was caused to the OSP surface protection paint due to a variety of activities. For example, the removal of rigging slings and grout lines prior to the initial lifting during installation. Following OSP installation, the cables were pulled in, stripped and terminated. During the course of these activities, it caused damage to the OSP paintwork on the cable deck, handrails and platform access stairs.

Ofgem's view

3.44. We consider that it was appropriate for the Developer to undertake these repairs. However, we note that a proportion of the paint damage was due to helideck repairs, out of scope work and other items such as heavy rust and/or metal defects that go beyond normal wear and tear. Therefore, based on discussions with the Developer, we have applied a reduction to the overall paint damages proportional to the out of scope work, repairs, rust and defects. This has resulted in the removal of £0.9m from the Developer's final submission.

Metering costs

3.45. The Developer submitted costs for metering equipment which were included with the SCADA and network costs. The entirety of these costs were apportioned between generation and transmission using a weighted average. According to the SCADA manual for

the OFTO, only a fraction of the total cabinets installed for the metering system are required for transmission purposes and therefore attributable to the Transmission Assets. In addition, costs for the metering interface to split generator and OFTO consumption were included following the original apportionment, however we consider that only the portion of costs corresponding to the capex ratio split should be allowed in the FTV.

Ofgem's view

3.46. We analysed metering costs and noted that metering costs were included, even those attributable to Generation Assets. The costs were apportioned between OFTO and Generator as part of a weighted average allocation key, which we disagreed with. We then identified the allocation of metering costs by considering the metering contracts outside of the weighted average allocation. Following this, the allocation of metering costs was recalculated and a further proportion of cost reallocated to the generation asset.

Fibre optic cables for generation related activities

3.47. Both the submarine and onshore cables installed for the Project contain fibre optic cable, owned by the OFTO but where a number of the fibres are used for the transmission of generation data but no costs for this were allocated to the Generation Assets. We worked with the Developer to estimate the cost attributable to the generation portion of the project for the use of the fibre optic cable and set the reduction accordingly.

Ofgem's view

3.48. Fibre optic cables are installed amongst the onshore and offshore export cables for offshore projects. These are used for both transmission and generation control and monitoring and communication purposes. As projects are now being constructed on a bigger scale and further offshore, cable lengths are increasing. This means that the cost associated with the supply and installation of the fibre optic cables can now be significant.

3.49. As the fibres used for generation purposes are not available to the OFTO and the OFTO gains no benefit from them, we requested that the Developer provide us with an evaluation of the cost that the generation portion of the Project should assume for their use of the fibre optic cables. Following the allocation review, the FTV was reduced to reflect the Developer's share of the fibre costs.

Contracts for operation and management

3.50. We identified that some contracts that were included in the March CAT were related to operation and management of the assets and were signed after first power.

Ofgem's view

3.51. According to the Cost Assessment Guidance "*we do not allow the capitalisation of operating costs as this is not within the scope of our OFTO cost assessment process*". We have therefore not included these costs in the FTV.

Adjustments proposed by the Developer

3.52. The Developer proposed a series of adjustments throughout the cost categories, including adjustments for:

- a) Decommissioned hydrocals that will not be transferred to the OFTO;
- b) Costs related to UXO identification which are pertaining to the generation portion of the Project; and
- c) Costs related to a cable protection system which was no longer required.

Ofgem's view

3.53. During the cost assessment process, we regularly discuss with the Developer all those costs that we do not consider economic and efficient. When the Developer recognises that an error has occurred during the CAT completion or agrees with our view, then we propose an adjustment. We then apply it to the cost assessment and describe it as a "Developer proposed adjustment". In total this reduced the FTV by £5.7m.

Submarine cable

Cable load out

3.54. The Developer submitted additional costs for delays and repairs prior to and during the load-outs of the submarine cables. The Developer explained that several events impacted the load-out process, resulting in further costs which were considered inefficient.

Ofgem's view

3.55. According to the Cost Assessment Guidance, "*we expect Developers to manage their contractors effectively*". We have deducted these costs (£0.4m) from the FTV as we do not consider them economic and efficient and they should be recovered through the appropriate contract.

Additional trials

3.56. The Developer submitted costs associated with additional trials to prove the cable laying vessel's installation capabilities. The Developer explained that the contract assumed the CLV Living Stone would be the installation vessel. It was expected by the time CLV Living Stone was due to work on the Project, the vessel would have undertaken sufficient trials and contract work to prove the vessel's capabilities and to shake down new equipment, machinery and personnel. However, due to the shipyard going into liquidation, the CLV Living Stone was late in delivery and another vessel (CLV Connector) was provided. The substitution clauses for a new vessel included an allocated time period for trials, however this timeframe did not allow sufficient time to prove the vessel and cable lay spread could carry out all cable installation tasks. Therefore, the Developer opted to undertake additional trials to test all aspects of the vessel and cable lay spread capabilities.

Ofgem's view

3.57. The CLV Connector vessel was accepted as a temporary substitute. However, as it wasn't a purpose built cable laying ship, it did not have the same capabilities as the CLV Living Stone and additional trials were required to prove the capabilities for the export cable installation. We have therefore deducted from the FTV, as we do not consider these additional trials to be economic and efficient as they should have been the contractor's responsibility.

Boulder clearance

3.58. The Project incurred additional costs arising from variation orders for additional boulder clearance works. There was a significantly higher number of boulders to clear than the seabed surveys, conducted prior to contract signing, had indicated. The Developer explained that it considered the initial surveys to be in line with good industry practice and therefore sufficient for the purposes of tendering for the cable installation contract. However, once a more robust survey was undertaken for the purposes of determining the

final cable route, the increase in boulders that required to be cleared led to a major change in the scope of works and a change in the equipment that was needed to be used.

Ofgem's view

3.59. In reviewing the sequence of events, in our view the Developer should have undertaken more robust seabed surveys to ensure that its contract with Tideaway was appropriate for the boulder clearance work to be required. Based on the information that was provided, the change in boulder removal scope required a change in equipment and vessels which led to an increase in costs, which we do not consider as economic and efficient. Based on discussions with the Developer, we have applied a reduction to the overall boulder clearance work proportional to the cost increase. This has resulted in a reduction of £8.9m from the Developer's final cost submission.

Additional barge for cable transport

3.60. The Developer hired the vessel CLV Living Stone for the cable transport, however it suffered serious delays due to the shipyard going into liquidation. The Developer requested the hiring Contractor to present a mitigation plan and at the same time the Developer's project team also started looking for alternative options, mainly the hiring of a new vessel. The new vessel hired was the CLV Connector, however it became apparent that this vessel could not berth in the cable supplier's facilities for loading operations as its hull was too large.

3.61. In order to load the cable on the CLV Connector as planned, the contractor arrived at two possible solutions: to dredge the port where the CLV Connector was moored or to use a barge that could transport the cable to the CLV Connector. The latter was the preferred option that was adopted.

Ofgem's view

3.62. The delay related to the CLV Living Stone's availability caused the change of vessel to the CLV Connector, which was not suitable to collect the cable from the supplier's facility. In addition, the vessel chosen could not enter the port used for the cable collection. This cost (£0.9m) was incurred as a consequence of interface issues, which are the Developer's responsibility to manage. For this reason we have not included this cost in the FTV, as this is not economic and efficient.

Standing time

3.63. We identified a number of costs associated with standing time. These issues cover multiple areas and are detailed below.

3.64. The Developer submitted costs for standing time. This standing time was caused by offshore jointing works completed ahead of schedule for the project and leaving personnel available to carry out other works. The Developer was not able to re-prioritize the availability of the jointing staff and this led to short notice changes of the agreed work schedule and standing time for the Contractor staff while various works were being completed.

3.65. The Developer submitted further costs for standing time due to the CLV Connector being delayed as this was a new vessel that was not ready by the required date.

3.66. The Developer also submitted costs for standing time due to bad weather. The Developer explained that works were carried out during winter to meet the planned construction programme and generation-related targets.

Ofgem's view

3.67. We examined the information and justifications provided by the Developer for the additional costs incurred due to all the standing time noted above. These costs were incurred due to late changes to the agreed working programme and various contractor delays which indicate interface issues along with reasons linked to generation related targets. Therefore and in accordance with the Cost Assessment Guidance, our view is that the costs associated with all these variations were not economic and efficient and we have not included them in the FTV.

Onshore cables

Acceleration works

3.68. When assessing cost variations, we noted that some were related to acceleration works. The Developer submitted costs associated with acceleration jointing works and early completion. The Developer explained that delays were the result of familiarisation of the installation plant by the contractor, the need for compliance with the Developer's safety

and quality requirements, external impacts which included meeting environmental and ecological requirements and a prolonged period of bad weather.

3.69. The Developer also submitted costs for additional work performed as overtime and during the weekend as part of acceleration works.

Ofgem's view

3.70. We reviewed information and justifications provided by the Developer for the costs associated with the variation orders for acceleration works. The Developer could not demonstrate to our satisfaction that the additional costs were not driven by generation-related targets and we have therefore not included the entirety of this cost. Similarly, a portion of the costs related to acceleration jointing works were due to interface issues and we have therefore applied a reduction to the overall cost. Costs related to early completion and overtime have not been included in their entirety, as we do not consider them an economic and efficient spend. Accordingly, we have removed the related costs from the Developer's submission.

Contractor damages

3.71. We investigated costs for variation orders related to various delays and damages from third parties. This included undertaking repair works due to cable damage, late handover of works and costs associated with materials and services (£0.3m).

Ofgem's view

3.72. We state in the Cost Assessment Guidance that "*we expect Developers to manage their contractors effectively*" and as such the Developer should seek recompense under the appropriate contract. Therefore, we have not included these costs (£0.3m) as they are not economic or efficient, as previously explained.

Onshore substation

Minor deductions

3.73. We applied two other minor deductions to the onshore substation category. One of these was for civil works where the instruction of minor additional works to close out the civil works is not uncommon in the industry, however we analysed some works carried out

which we considered as not economic or efficient. The other is for space occupied by the Generation Assets. In recent projects we have observed that the space occupied by equipment housed within the onshore substation for generation purposes is increasing in proportion to the project size and therefore we have apportioned the cost associated with housing the Generation Assets.

Ofgem's view

3.74. We are increasingly scrutinising costs associated with generation related equipment for new projects to ensure that the apportionment between generation and transmission assets is appropriate and costs remain economic and efficient.

RCS

Variation orders for RCS design

3.75. Rambøll was engaged as the engineering and design contractor for the RCS. In the early stages of the contract, there were difficulties with the original contractor appointed for the engineering, design and construction of the RCS. The Developer, after evaluating the situation, decided to designate another contractor for the construction of the RCS and to appoint Rambøll for the design and engineering portion of the Project.

3.76. Once the RCS arrived at the facility of the new contractor chosen for fabrication completion, the Developer commissioned Rambøll with an investigation to ensure that the scope of work to complete the RCS was clearly understood.

Ofgem's view

3.77. The Cost Assessment Guidance clearly states it is the responsibility of developers to manage their contractors so that the quality and timing of works are performed efficiently. Whenever this is not achieved and additional costs arise, these are not included in the cost assessment, as this is not economic and efficient.

Development costs

3.78. The assessed development expenditure for the Transmission Assets at FTV is £59.6m, a decrease by £20.8m since ITV. The detailed cost increases and decreases are set out in Table 2 above and include updates due to firming-up of costs included in the FTV submission and costs reductions as part of the assessment process.

3.79. We applied a reduction for land acquisition costs related to the Hornsea Project Two project for the ancillary costs that should have been attributed to the future project. A further reduction of £0.7m was made for ongoing land related costs, incurred after first power and therefore falling within the operational period. Operational costs are not considered as construction or development costs and therefore cannot be included in the FTV. We also reallocated £14.2m of costs to Capex (see section 3.34).

Contingency

3.80. The Assessed Costs do not contain a separate contingency value. £16.1m of the contingency that was submitted at the ITV stage was either used or not realised and therefore was not included by the Developer in the February CAT.

Interest during construction

3.81. In the February CAT, the Developer included £134.5m of IDC, a £31.9m increase since ITV (in line with the Developer's approach used in the ITV submission). This is based on the Developer's position that the Transmission Assets are available for use when the Interim Operational Notification Part B (ION B) provided by National Grid is received, which is the first point at which active power can be exported to the grid. We consider, as stated in the cost assessment guidance, that IDC will cease *"...as soon as Transmission Assets are available for use for the transmission of electricity to the onshore network"*.

3.82. The Project was divided into 3 areas for the purposes of energisation: Central, East and Western circuits. In the Cost Assessment Guidance we state that *"we will consider the length of time over which IDC is applicable, and if we consider there is evidence of inefficient and uneconomic time periods during the pre-construction, construction or commissioning programme for the Transmission Assets, the period of IDC applicability may be adjusted to reflect this"*. In line with this principle, we analysed the information provided by the Developer around the energisation and commissioning activities and noted that the

duration between the energisation and ION B dates on certain circuits was not economic and efficient.

3.83. We commissioned a consultant to advise us on the appropriate point in time when the assets could be considered safely energised and commissioned in order to establish when the IDC should cease. In conjunction with our advisers, we concluded that these circuits could be considered safely energised and commissioned prior to the ION B dates and calculated the interest accrual accordingly, resulting in a reduction to the Developer's calculation of increased IDC referred to above.

Ofgem's view

3.84. This overall increase in IDC was further partially offset by a reduction in IDC proportionate to the reduction in Capex for disallowed costs that had accrued IDC during the construction phase of the Project. A proportion of the disallowed costs were incurred after IDC ceased, therefore no adjustment to the IDC was made for these costs. The overall reduction to IDC is £20.4m to the February CAT (see Table 1) which results in an increase of £11.5m since ITV. The total IDC for the Transmission Assets at FTV is £114.1m.

Transaction costs

3.85. The Developer has submitted a firm estimate of the transaction costs it expects to incur to asset transfer. We have reviewed this estimate and assessed transaction costs at £3.8m.

3.86. The Developer provided a breakdown of the transaction costs submitted. They included both internal and external costs. The external costs related to professional services in respect of the tender, e.g. legal. We have concluded that the costs provided by the Developer were allocated appropriately.

3.87. Transaction costs increased by £0.2m since the ITV due to the transaction budget being revised and costs being firmed up.

Ofgem's view

3.88. Transaction costs can only be provided to us by developers to a reasonable degree of accuracy towards the end of the tender process. We have considered the level of costs

submitted and concluded they are in line with expectations and are considered efficient and economic.

Confirmation in relation to tax benefits

3.89. The ITV was calculated on the basis that the OFTO would obtain the full benefit of all available capital allowances. If this were not the case for the FTV, we would reduce the assessment of costs for an amount that reflects the value of the tax benefit retained by the Developer. The Developer has confirmed that the OFTO will be able to obtain the full benefit of all available capital allowances. At the time of licence grant, when FTV will be defined, this will be translated into the FTV coinciding with the Assessed Costs, should no other conditions change.

4. Conclusion

In conclusion, in accordance with Regulation 4 of the Tender Regulations, the Authority has assessed the economic and efficient costs which ought to have been incurred in connection with developing and constructing the Transmission Assets as £1,174,931,778.

Appendices

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Appendix 1 - Glossary

A

Assessed Costs

The final assessment of costs determined by Ofgem through the cost assessment process for the Hornsea Project One Offshore Wind Farm transmission assets.

C

Capex

Capital Expenditure

CAT

Cost Assessment Template

Cost Assessment Guidance

See definition in Section 1 of this report

D

Developer

Hornsea One Wind Farm Limited

E

EPQ

Enhanced Pre-Qualification

EPCI

Engineering, Procurement, Construction and Installation

F

February CAT

The Developer cost assessment template submitted on 28 February 2020

FTV

Final Transfer Value

G

GEMA

The Gas and Electricity Markets Authority

Generation Assets

The Hornsea Project One Wind Farm Generation Assets

GT

Grant Thornton

I

IDC

Interest During Construction

InTV

Initial Transfer Value

ITT

Invitation to Tender

ITV

Indicative Transfer Value

ITV letter

See definition in Section 3.13 of this report

J

January 2019 CAT

The Developer cost assessment template submitted on 31 January 2019

M

March CAT

The Developer cost assessment template submitted on 1 March 2019

MW

Megawatt

O

OFTO

Offshore Transmission Owner

OFTO licence

See definition in Section 1 of this report

OFTO regime

See definition in Section 1 of this report

OSP

Offshore Substation Platform

P

PIM

Preliminary Information Memorandum detailing the Project's details released to EPQ bidders through the tender portal.

PM

Project Management

Project

The development and construction of the Transmission Assets

Q

QTT

Qualification to Tender

S

Section 8A Consultation

See definition in Section 2.13 of this report

T

Tender process

See definition in Section 1 of this report

Tender Regulations

See definition in Section 1 of this report

Transmission Assets

The Hornsea Project One Offshore Wind Farm Transmission Assets

TRS

Tender Revenue Stream